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AUTHOR Beilby, Albert E.
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ABSTRACT

This paper discusses the development and implementation of a cost analysis model for use by curriculum planners and developers in evaluating educational programs. The paper consists of four major sections that focus in turn on the need to approach educational costs from a nontraditional perspective, development of a cost model, implementation of the model, and results of implementing the model. After presenting a functional cost analysis matrix and discussing its development, the author describes how the model was field-tested using competency-based teacher education programs in New York universities. Based on this field test, the author concludes that functional costs analyses appear to be a viable alternative to current jurisdictional cost procedures, and that the cost analysis matrix is a valid tool from which to construct a functional cost study. (JG)

APPLICATION OF AN ALTERNATIVE COST ANALYSIS MODEL TO EDUCATIONAL PROGRAMS

by Albert E. Beilby
Cornell University

This paper describes the development and testing of a model which addresses problems of costing educational programs. Four major areas are discussed:

1. The need to approach educational costs from a non-traditional perspective.
2. Development of a cost model.
3. Implementation of the model.
4. Results of implementing the model.

A summary will discuss the import of this particular study on educational costing.

Background and Rationale

To evaluate an educational program we need information about a program's effectiveness for increasing student learning and the program's cost. Cost effectiveness analysis has become a standard evaluative approach to secure this information. Many cost effectiveness studies have been conducted in which the primary focus has been on identifying program outcomes and effectiveness measures.

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Very little attention has been given to the cost side of cost effectiveness. The most common approach to attaching costs to outcomes has been to allocate institutional finance data across various departments by some standard or proportional distribution rule. Little or no attempt is made to determine how closely these allocated costs reflect reality. The prevailing philosophy has been to accept the dollar amounts reported in financial statements as "Truth". After all, the debits and credits are shown to balance to the penny.

Although not commonly recognized by laymen, cost accountants' figures are estimates rather than reality; they are real only by consensus. The practice of allocating institutional costs across departments and programs creates an unclear picture of resource consumption. It is difficult, if not impossible, to express the functional relationship between program cost and program outcomes. What follows is a proposal for an alternative approach to determine program costs. In effect, the proposed approach is an attempt to refine cost estimates and to functionally relate costs to outcomes.

Since at least 1965, when Jones (1965) examined costs of alternative instructional strategies at Michigan State University. the term "functional costing" has been used by a small circle of analysts to describe cost procedures which attempt to relate program costs to program outcomes. Conventional costing procedures typically have as cost centers an organizational unit over which some specific administrator has jurisdiction. The term used to describe these procedures is "jurisdictional costing".

It is important to make a distinction between jurisdictional costing and functional costing.

Jurisdictional costing refers to the common practice of organizing costs according to the administrative organization of an institution. A jurisdictional cost structure reports costs by gross categories for colleges, divisions, or departments. To arrive at some smaller unit the reported jurisdictional cost may be averaged over all sub-units. The fact that the reported jurisdictional cost may already contain allocated costs of dubious accuracy compounds the problem of getting a clear, accurate statement of costs for any sub-unit.

Functional costing is an attempt to relate costs to outcomes. The most familiar approach has been program budgeting (PPBS). However, the emphasis of program budgeting has been on identifying programs, not on identifying costs. In program budgeting, jurisdictional costs are allocated to defined programs through fairly simplistic formulae. The practice results in program cost figures which include costs irrelevant to the program.

Functional costs build upon existing financial records, but not on formal financial statements, that is, raw data such as equipment costs and personnel salaries are taken from records but assembled in a manner to reflect actual resource consumption by a program.

Non-cost data are required to establish functional costs. For example, it is useful to know a program's actual use of equipment, personnel, or other resources which may be shared with other programs. Such information can be attained only by collecting original data.

In early attempts to apply functional costing to educational programs (Jones, 1965; General Learning Corporation, 1969), the program outcomes served as functions. In more recent applications (Chappel, 1970; Doughty, 1972; Belmore, 1972) the term "functional" has taken an added dimension by recognition

and inclusion of life-cycle costing. Figure 1, adapted from studies sponsored by Rand Corporation (McCullough, 1966), illustrates the life-cycle cost concept. The life-cycle of a program is shown as consisting of three phases: a research and development phase, an investment phase, and an operation phase. Furthermore, as shown in Figure 1, these phases may overlap in time. Expressing costs in terms of these phases would be beneficial in program evaluation since that would allow decision makers to attribute costs to some developmental phase of a program in addition to a particular program outcome.

Model Development

Development of the functional cost model used in this study will now be described.

Figure 2 represents initial conceptualization of a functional cost study. The matrix, adapted from Doughty (1972), represents a strategy for categorizing costs for program outcomes. The vertical axis contains the three life-cycle phases of Figure 1; here the terms Design, Investment/Production and Operation are used to better reflect development and implementation of an educational program. The horizontal axis contains cost categories or account names.

One of the more frustrating aspects of financial accounts is the lack of uniformity in naming them. A review of nineteen cost studies (Doughty and Beilby, 1974) revealed 94 distinct account names. Thirteen of the names were some variant for "materials and supplies".

The diversity in names for education financial accounts required a selection or adaptation of account categories. To develop categories that would enhance data reliability, judges were asked to cluster the 94 cost

Figure 1

Life-Cycle Costing

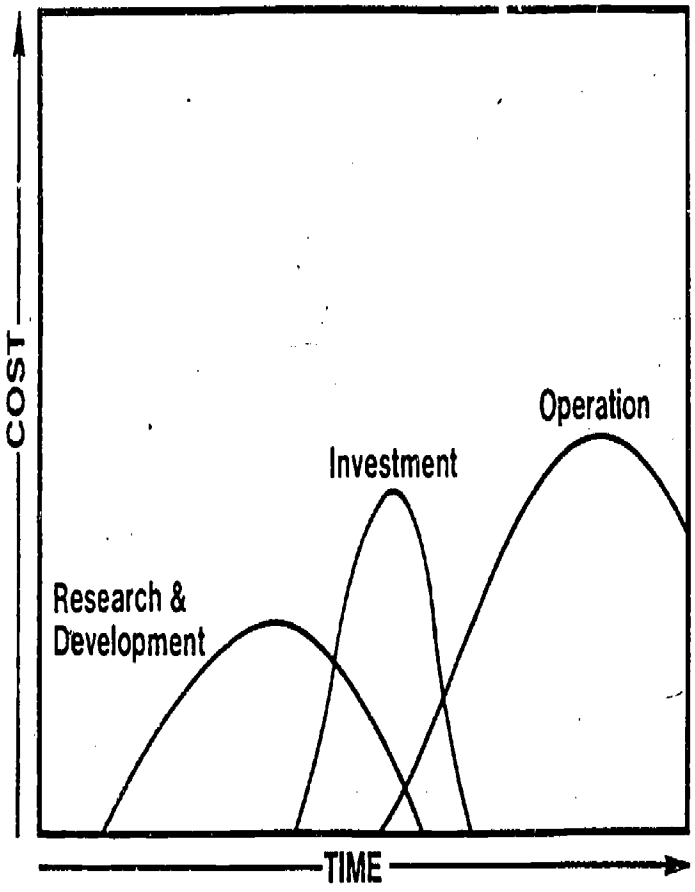

Figure 2

Conceptual Framework for a Functional Cost Analysis

Life Cycle Phases \ Cost Categories	Category 1	Category 2	Category 3	Category 4...n	Total Costs
Design	$	$	$	$	$___
Investment/ Production	$	$	$	$	$___
Operation	$	$	$	$	$___
Total Costs:	$___	$___	$___	$___	

account names under categories developed by the author.

Inter-coder agreement between three judges was computed by Scott's (1955) index of reliability. Figure 3-A gives the formula for this index and observed intercoder agreements. In the formula, Po refers to observed agreements and Pe refers to agreements to be expected by chance. Agreement to be expected by chance was computed to be 0.14. The observed agreements contained in Figure 3-B were significant at $p = 0.001$.

Figure 4, which is a refinement of Figure 2, contains the categories resulting from the process just described. To implement the study, this matrix was used as a guide to generate data collection instruments. That is, questions were generated to collect data for each cell except the Operation/ Facilities cell which, for the purposes of this study, was viewed as an irrelevant cost. The only facilities cost considered in the study was the investment made to alter existing facilities.

Questionnaires underwent a series of pilot tests until the final format was achieved. The final questions focused on activities for some purpose which would occur in an education program during one of the three life-cycle phases. Judges were asked to place activity statements into one of the three life-cycle phases in order to determine the reliability with which responses to questions could be categorized. Intercoder agreement among three judges is shown in Figure 3-B.

Agreement expected by chance was 0.34. These observed agreements were significant at the $p = 0.001$ level.

So far, the general framework for the study has been presented (Figure 2) and the development of the specific framework for the study (Figure 4) has been described. A major portion of the questionnaire developed from Figure 4 is

COST ANALYSIS MATRIX

CATEGORIES / PHASES OF INSTRUCTION	PERSONNEL: SALARIES AND BENEFITS	PERSONNEL: CONSULTANTS	ADMINISTRATION	SERVICES	HARDWARE	SOFTWARE	FACILITIES	TOTAL
DESIGN								
INVESTMENT/ PRODUCTION								
OPERATION: ONE CYCLE								

FIG. 4 Generic cost analysis matrix.

Scott's Index $\pi = \frac{Po - Pe}{1 - Pe}$

Intercoder agreements at p = 0.001	A	B
C	0.81	0.86
B	0.93	1.00

Figure 3A: Formula for Scott's Index of Reliability and observed intercoder agreements for cost categories.

	A	B
C	0.72	0.86
B	0.68	1.00

p = 0.001

Figure 3B: Intercoder agreement for categorizing activities by life-cycle phase.

contained in Appendix A. Not included in Appendix A are forms on which support personnel reported and on which support services were identified.

We will now move to implementation of the study.

Implementation: Methods and Procedures

At the outset, Competency-Based Teacher Education (CBTE) programs were targeted as the group on which the cost model would be tested. Any educational program would have served, but on a number of counts competency-based programs seemed a logical choice. First, outcomes of the programs were supposed to be tightly defined. Secondly, controversy and claims that competency-based programs were more costly than conventional teacher education programs gave program administrators a reason for being interested in costs.

Administrators were indeed interested in CBTE costs. Although, as it turned out, key programs which would have increased representativeness of the study were not anxious to participate. The major problem seemed to be identifying programs far enough along in 1975 to have implemented a full semester of CBTE. While there was much rhetoric, there were few programs up and going.

The newness of CBTE and diversity of approaches suggested that a national sample of competency-based programs would be no more representative than a state or regional sample. Therefore, the cost-study was limited to programs in New York State. The conveniences and reduced expense of conducting an in-state study were also factors in limiting the study to New York. Furthermore, teacher training institutions in the State were under administrative mandate to establish CBTE and implementation deadlines had been set.

Programs included in the study were limited to four for ease of handling.

The programs were not selected randomly because of the small sample (which was to plague the study throughout). An attempt was made to represent geographic regions and the three New York State institutional groups of SUNY, CUNY, and PUNY; the latter reference being to private universities. Unfortunately, few CUNY units had implemented a CBTE program; those that had were not receptive to the cost study. The final study composition is shown in Table 1. It was not as representative as originally intended.

Self administered questionnaires were selected as the data collection method. There were several reasons for this choice. First, the investigator was anxious to produce simple, self-administered, validated instruments which required minimal investment of money and time for data collection. Second, other options were not feasible. Diaries of personnel activities could not be examined because there were no diaries. Observation, so useful in industrial time and motion studies and in cataloging a variety of activities, was not appropriate because of the non-repetitive dynamics inherent in instruction at the post-secondary level. Interviews were ruled out because the number of programs and personnel were beyond the investigator's resources. None of these alternative approaches was conducive to self administration.

To increase the probability that faculty would complete and return questionnaires, a meeting was held with program personnel to explain concepts and procedures of the study. In addition, a liaison person was designated at each site. More time was spent with the liaison than with other personnel in order to describe subtler aspects of the study and to establish timelines for data collection. The liaisons received remuneration for their effort and became the primary program contact.

Data collected were purchase or rental prices, salaries and time. Cost

of equipment, supplies, software and hardware was identified, personnel salaries were determined, remitted tuition was considered. The number of hours personnel committed to the program and their use of various resources was determined through self-reported responses to the questionnaires. Hourly data, purchase prices and salary figures were combined to produce cost data.

To set parameters for the study, a single semester was to serve as the focus of data collection. That is, participants were asked to report time involved in planning, implementing and evaluating a single semester. This required participants to identify and include planning for the semester which actually preceded the semester's start and also evaluation efforts which may have extended beyond the semester. Data were computed and cost analysis reports were returned to each program. Appendix B consists of selected pages from a cost analysis report.

In cost analyses reports, costs were reported for the entire program and by competency clusters which were organized according to a conventional course format (see Tables I and II, Appendix B). In the case of total program costs, computations from raw data were presented, then the data were manipulated to isolate design costs and amortize them over a number of cycles.

The rationale for amortizing design costs is as follows: design costs are analogous to industrial "research and development" costs. They may not provide an immediate return on investment, and to assign all design costs to the immediate semester or course cycle may not be the most realistic way of treating them. With that in mind, the assumption was made that one-third of the design costs would have a direct impact on subsequent cycles of a course. This information was incorporated as an optional set of figures in all report tables.

In addition to total program costs, total costs were calculated for each competency cluster and were further reduced to provide costs for each life-cycle phase. In all instances both raw data and data indicating amortization of design costs were given (see Tables III and IV, Appendix B).

Appendix B also contains charts and figures indicating relations between enrollment and operation costs, and describes how equipment costs were determined. Other types of information contained in the reports include cost per pupil and analysis of costs by categories and life-cycle phases.

Analysis of Results

Findings will now be reported concerning:

1. the acceptance of the functional cost analysis by participants;
2. the acceptance of procedures used in the study;
3. the reliability of participant estimates concerning time and use;
4. the validity of the questionnaire, cost analysis reports, and cost matrix.

The small sample size and (usually) nominal data were not amenable to inferential statistical analysis. Therefore, much of the study findings are based on descriptive statistics.

Following initial data collection, participants were asked to respond to questions about functional costing and about data collection procedures. Respondents were selected by the program liaison persons. The number of persons responding to the evaluation is given in Table 1. Only three programs responded. Summer recess and resultant delays caused the investigator to abandon the evaluation at the fourth program.

Table 2 reports participant reaction to the amount of time required to complete the questionnaire. Table 3 reports participant attitude toward the

TABLE 1

Composition of Cost Study

Program	Institution Type & Location	# Faculty	# Students	# Respondents Who Evaluated Study
A	Small, Private, Downstate	8	32	8
B	Small, SUNY, Central N.Y.	10	13	5
C	Large, Private, Central N.Y.	7	28	5
D	Large, Private, N.Y.C.	7	27	0

TABLE 2

Participant Reaction to the Amount of Time Required to Complete Questionnaires

Reaction	n	% N
No answer	1	6
Time was not the problem, forms were too difficult	6	33
Time required was O.K.	4	22
Too much time required (negative response)	7	39
	18	100 %

TABLE 3

Attitude of Participants Toward Data Collection Instruments

Response Category	n	% N
Negative	12	67
Positive	4	22
Anxiety	2	11
	18	100 %

TABLE 4

Most Troublesome Aspects of Questionnaires

Problem	n	% N
No problems identified	6	33
Everything in general	2	11
Unclear directions or terms	3	17
Estimation process	7	39
	18	100 %

TABLE 5

Participant Reactions to Functional Cost Analysis

Participant Response	n	% N
Desirable	9	50
Not desirable	4	22
Not qualified to judge	2	11
No answer	3	17
	18	100 %

questionnaire. Table 4 reports the most troublesome aspects of the questionnaire. Taken together, the tables suggest the questionnaire was not well received. Anecdotal data would convince you they were not. Why were 67% of the responding participants negative about the questionnaire? It is long and it required considerable fortitude to sit down and thoughtfully generate the required information.

In spite of a bad experience with the questionnaires, Table 5 indicates that 50% of the participants found a functional cost analysis desirable. Had the questionnaire been more palatable, more participants may have found functional costing "desirable".

Reliability. Reliability of estimates was determined from two perspectives. First, since these data were ordinal, Pearson's r and the reliability coefficient were computed. Results are contained in Table 6. Some fairly strong correlations were noted, but notice the standard error of estimate. While there appeared to be consistency, there was considerable variability between the first and second estimates.

The second approach to reliability was to compute intracoder agreements. Here a peculiar problem had to be dealt with. One would not expect two estimates about time spent on a generally defined task to be precisely the same. It would vary according to the precision with which the task is defined and with the magnitude of the number of hours devoted to the task. Some guides for tolerance were arrived at through the aid of judges, and these tolerance ranges were incorporated into the reliability computations. A summary of intra-coder reliability results is contained in Table 7. They were low.

Validity. Lack of estimate reliability was a blow to all forms of validity except content validity. The reliability coefficients suggest, in

TABLE 6

Correlation and Reliability Coefficients of Estimates

Estimate Cluster	N	r	r^2	sig.	std. error of est.
All Estimates	13	0.69	0.48	0.004	156.4
	12*	0.99	0.98	0.00001	33.6
Planning; designing materials; selecting materials; etc.	13	0.86	0 68	0.0002	54.9
Research to increase personal knowledge about CBTE.	13	0.89	0.79	0.0002	7.9
Purchases; production of materials for class use; related activities.	13	0.63	0.41	0.009	13.9
Instruction; student evaluation.	13	0.49	0.24	0.044	73.1
	12*	0.99	0.98	0.00001	12.6
Advising students not in course taught but who are in CBTE program.	13	-0.04	0.002	0.444	11.8
Disseminating information about program.	13	0.68	0.47	0.005	8.4
Value of software consumed.	13	-0.13	0.02	0.332	17.2
Use of hardware.	13	0.22	0.05	0.233	11.4
	12*	0.87	0.76	0.00009	5.8

* N of 12 indicates recomputation to eliminate an extreme case.

TABLE 7

Summary of Intracoder Reliability Results

N	Range	Mode	MDN	MN	SD
13	0.25-0.87	0.37	0.50	0.52	0.25

fact, that the questionnaires did possess content validity. Additional support was obtained from participant evaluation of the cost analysis reports. Tables 8 and 9 report these evaluations.

To summarize some of the more salient features of Tables 8 and 9:

53% of the participants indicated they viewed the report favorably;

77% indicated they understood all or most of the report;

85% indicated that reported data were at least moderately valid and reliable;

67% indicated that reported data were at least moderately valuable to them;

100% (of those answering the question) reported that some cost data confirmed their beliefs about costs.

The data suggest that reports possess content validity and this in turn has a bearing in the content validity of the questionnaires and the matrix; since the reports were developed from the questionnaires which were developed from the matrix.

Summary

To briefly summarize the major study outcomes:

1. The questionnaire was not liked;
2. Even so, the concept of functional costing is workable and evidently acceptable;
3. The faculty estimates were not very reliable;
4. But, the instruments used in the study appear to be valid.

Two of these outcomes are positive and two are negative. To accentuate the positive : functional cost analyses appear to be a viable alternative to current jurisdictional cost procedures, and the cost analysis matrix was shown to be a valid, useful tool from which to construct a functional cost study.

TABLE 8

RESPONSES TO PART I OF THE EVALUATION OF THE COST ANAYLSIS REPORT
GENERAL NATURE OF THE REPORT

Question	Number of Responses by Category			
1. How do you view report?	Favorably=7***	Unfavorably=1	Neutral=5*⊕	
2. Do you understand report?	All=2	Most=8***	Some=3*⊕	None=0
3. What parts do you not understand?	No answer=3	Tables=3*	Inconsistent terminology=2*	How unit costs were obtained=1
	Accuracy of report=3*⊕	Distinction between design and operation=1*		
4. What general information is extraneous?	No answer=2	Nothing=4**	Equipment/hardware costs=6**⊕	Too many tables=1
5. What general information is key?	Cost/pupil=10***	All costs=2*⊕	Weakness of data collection method=1	
6. What parts of report would you change?	No answer=2	More visual representations=2**	Greater consistancy of terms=2⊕	Add directions about how to use data=1
	Clarify allocation of design costs=1*	Add measure of outcome quality=2	Increase time span=3*	
7. What parts of report would you continue?	No answer=8	Charts & tables=1⊕	"Results" section=1*	How to reduce costs=1*
	Report of raw data=1*	Hardware costs=1	Raw data and time allocation*	

Note.--Some questions and responses have been paraphrased for brevity. Original questions are contained in Appendix J.
*An asterisk indicates response of a program director. Four directors responded.
⊕ Response of financial officer.

TABLE 9

RESPONSES TO PART II OF THE EVALUATION OF THE COST ANALYSIS REPORTS

PROGRAM COST DATA

Question	Number of Responses by Category			
1. How reliable are data?	Very=4*	Moderately=7** ⊕	A little=1	Not at all=0
2. How valid are data?	Very=1* Uncertain=1	Moderately=10** ⊕	A little=0	Not at all=0
3. How valuable are data to you?	Very=1*	Moderately=7** ⊕	Slightly=4	Not at all=0
4. Which program data are extraneous?	No answer=6* ⊕	None=3*	Software & hardware costs=2*	Distinction between design & operation=1
5. Which program data are key?	No answer=3*	Cost/pupil =8* ⊕	Effect of enrollment on cost=1*	
6. Which data confirms your beliefs?	No answer=4** ⊕ Course costs=2	Most=1 High design costs=1*	Effect of enrollment on cost=3	Expense of student teaching=1
7. Which data does not confirm expectations?	No answer=7** ⊕ Claim that student teaching costs could be reduced=1	Costs appear too low=1	Design costs seem high=1	Administrative costs seem high=1
8. Which data inspire you to change anything in program?	No answer=5** ⊕	None=3*	Question irrelevant (no authority to change)=3	Reduce administrative involvement=1
9. Which aspects of program does data encourage you to continue?	No answer=7*** ⊕	Total costs o.k.=3	Design costs o.k.=1	

Note.--Some questions and responses have been paraphrased for brevity. Original questions are contained in Appendix J.
*An asterisk indicates response of a program director. Three directors responded.
⊕ Response of financial officer.

Even the negative outcomes can be viewed positively since both strengths and weaknesses provide an indication of steps which might be taken in future cost studies. In closing, this paper will examine a few of these guideposts.

A questionnaire as lengthy and detailed as the one used in this study should be avoided. Unfortunately, most cost studies seem to employ long, detailed questionnaires with many support documents. Full acceptance and understanding of functional costing by program personnel may be the only way of avoiding such a detailed questionniare; however, such understanding is not likely to arise unless a workshop or similar training situation is implemented. Such a workshop is very desirable, but a stipend for participants should be planned in order to get the fullest attention and participation from faculty.

The study just described looked at historical costs. Current costs also need to be examined. An eventual goal is to project functional costs in order to provide decision-makers with cost effectiveness alternatives. But we need first to work in the present until a better understanding of functional costing is achieved. An advantage of working with current costs as opposed to historical costs is that the validity and reliability of cost data would be higher.

This study examined single programs in several institutions, but there is a need to examine several programs within a single institution. In such an investigation programs experiencing joint costs could be analyzed to determine how well functional costing treats these costs.

There is also a need for comparative cost studies to determine whether functional or jurisdictional reports communicate more, better.

These are directions for future investigations. There are two things

to bear in mind in any such future studies. One is that costs are estimates, and we want to refine those estimates as much as we can. The other item concerns the role of functional costing: Because of huge computer management system investments, functional costing will not immediately replace present jurisdictional cost procedures in financial accounting. Functional costing does, however, have immediate utility in program evaluation (Haller, 1974).

The study described in this paper, though not without shortcomings, was a logical step in a sequence of studies required to determine the utility of functional costing for educational programs. It is hoped that others may profit from the methods and experiences described in order that the next logical steps in the sequence may be taken.

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APPENDIX A

Faculty Questionnaire

COMPETENCY-BASED TEACHER EDUCATION COST ANALYSIS PROJECT

FACULTY QUESTIONNAIRE Institution _____

Name _____

The term "cycle" will occur throughout this questionnaire. Cycle refers to the period of time required to plan, design, implement and evaluate a unit of instruction. In this questionnaire, the cycle to be considered is:

_____,

herinafter described as the "cycle under discussion."

The term "course" will be used also. If you do not follow the traditional course structure, interpret the term loosely.

PART I

This portion of the questionnaire focuses on the amount of time you spent on the competency-based program.

1. You spend a certain amount of time on matters related exclusively to the competency-based program. You are also likely to spend time on matters related to other aspects of academic life. Such involvement might include committee work, advising doctoral students, teaching courses outside the competency-based arena, private research, and communication with visitors, potential students, and colleagues.

   Estimate what you believe represents your average weekly involvement in these two categories of activities during recent semesters.

   Competency-based program activities: _____hrs/wk

   Other academic activities: _____hrs/wk

2. List below the name and official number of the "courses" in the competency-based program in which you were involved and which were taught during the cycle under discussion. NOTE: Not limited to courses you taught. (You may not require all of the five spaces provided; conversely, if more space is required, provide attachment.) In the last two columns, indicate the number of students enrolled and how often you've taught the course.

   1. _____ ___ ___ ___

   2. _____ ___ ___ ___

   3. _____ ___ ___ ___

   4. _____ ___ ___ ___

   5. _____ ___ ___ ___

   The numbers 1 through 5 above will be used as a shorthand method of identifying your "courses" in the remaining portion of this questionnaire. An example of this system follows, in which a faculty member evaluates the two "courses" he taught and assisted a colleague in evaluating a third:

EXAMPLE:

How many hours did you spend this last cycle evaluating materials and/or the instructional process?

1. 45 2. 7 3. 1 4. ____ 5. ____

If the question does not apply, enter "N.A." or "0".

NOTE: If for some reason you are involved in, say, eight "courses," insert the additional data in the space below the response line.

3. This question deals with design/planning functions. These activities may have occurred far in advance of actual instruction. They must have been performed only for the cycle under discussion, i.e., if you've taught a course three times and modify materials for each cycle, consider only the modifications made for the cycle under discussion. Give <u>total hours</u> per cycle, not hours per week.

A. Planning the form, structure or content of the <u>program</u> (not individual "courses"); i.e., arriving at a general idea of what program will be:

TOTAL: _____

B. Planning form, structure, and general content of "courses"; i.e., arriving at a general idea of what "course" will be:

1. ____ 2. ____ 3. ____ 4. ____ 5. ____

C. Planning form, structure and content of instructional materials; i.e., specific descriptions of "course":

1. ____ 2. ____ 3. ____ 4. ____ 5. ____

D. Planning facility improvements:

1. ____ 2. ____ 3. ____ 4. ____ 5. ____

E. Designing instructional materials after having decided form, structure and general content (if you incorporated this data in C, go on to F):

1. ____ 2. ____ 3. ____ 4. ____ 5. ____

F. Selecting instructional material already existing:

1. ____ 2. ____ 3. ____ 4. ____ 5. ____

G. Research to increase personal knowledge about competency based instruction and programs:

TOTAL: _____

H. Formative evaluation of process, content, modules or materials:

1. ____ 2. ____ 3. ____ 4. ____ 5. ____

I. Support activities for any of the above (include supervision of support personnel):

1. ____ 2. ____ 3. ____ 4. ____ 5. ____

4. This section focuses on investment/production functions. While the activities may have been performed far in advance of instruction, they must have been performed only for the cycle under discussion.

A. Purchase of hardware or equipment:

1. ____ 2. ____ 3. ____ 4. ____ 5. ____

B. Purchase of materials (books, paper, etc., but not office supplies not used for instruction):

1. ____ 2. ____ 3. ____ 4. ____ 5. ____

C. Purchases for renovation of facilities for specific instructional purposes:

1. ____ 2. ____ 3. ____ 4. ____ 5. ____

What was the total cost (including hired labor) of facility renovation?

$ _____

D. Production of materials for instruction or for student evaluation (not design of materials, but physical production of them):

1. ____ 2. ____ 3. ____ 4. ____ 5. ____

E. Management of personnel involved in the production or purchase of materials or equipment:

1. ____ 2. ____ 3. ____ 4. ____ 5. ____

F. Support activities for investment/production (comparing prices, using catalogs, meeting sales personnel, etc.):

1. ____ 2. ____ 3. ____ 4. ____ 5. ____

5. This section focuses on activities closely related to instruction during the cycle under discussion.

A. Instruction. (If self instructional materials were used, there may have been no instruction. Lab supervision, distribution of materials and similar tasks can be accounted for in B):

1. ____ 2. ____ 3. ____ 4. ____ 5. ____

B. Activities supporting instruction (include organizational and logistical activities for specific classes, but not design of materials for those classes):

1. ____ 2. ____ 3. ____ 4. ____ 5. ____

C. Advising students in your "courses":

1. ____ 2. ____ 3. ____ 4. ____ 5. ____

D. Advising other students enrolled in program:

TOTAL: _____

E. Student evaluation/assessment:

1. ____ 2. ____ 3. ____ 4. ____ 5. ____

F. Summative evaluation of materials for the instructional process:

1. ____ 2. ____ 3. ____ 4. ____ 5. ____

G. Dispensing information about the program (for which no consulting fees or honorariums are received):

TOTAL: _____

H. Management and leadership connected with any of the above (include instructions to secretaries and assistants):

1. ____ 2. ____ 3. ____ 4. ____ 5. ____

PART II

This part of the questionnaire attempts to identify the cost of software which was consumed for the design or operation of the cycle under discussion.

Directions: On the facing page are three columns. In column one are listed classifications of software. In column two, and using the number system 1 through 5 developed in PART I, you are to list by "courses" the value of the software consumed for design activities. (The actual time that the money was spent is irrelevant here. If you use paper that was purchased a year ago, for example, treat it as if you were purchasing it at the time of consumption.) In column three, perform the same task for software consumed during the instructional activity.

Guideline: The value of xerox copies of a chart produced for class distribution should be listed in column three. The earlier consumption of material for designing the chart (probably of very little value) should be listed in column two.

EXAMPLE:

(1)	(2)	(3)
Paper	1 = 25¢, 2 = $3.25 / 3 = 0	1 = $10, 2 = $35 / 3 = $2

(1)	(2) (design)	(3) (instruction)
PAPER		
PRINTING		
FILM		
FILMSTRIP		
SLIDES		
STILL PHOTOS		
TRANSPARENCIES		
VIDEO TAPE		
AUDIO TAPE		

PART III

In this part of the questionnaire, you are asked to identify the number of hours that equipment and hardware was used in order to implement your "courses" during the cycle under discussion.

1. Use the checklist below to identify hardware and equipment used for the design, production, or implementation of your course.

HARDWARE

Cameras:
—TV
—16mm
—8mm

Projectors:
—Overhead
—Opaque
—Slide
—Filmstrip
—16mm film
—8mm film (reel)
—8mm (filmloop)

—Screens
—TV monitors (viewing)
—Tape recorders (reel)
—Cassette recorders
—Record players
—Teaching machines (identify type):_____
—Microphones
—Headsets

EQUIPMENT
(if more than one, identify specifically)

—Typewriter:
_____
_____
—Thermofax
—Ditto
—Offset

—Xerox
—Other duplicating equipment (specify type)

—Calculator (type):

****

NOTE:
Since you have distributed short questionnaires to your assistants and office staff, you need only respond to the following section in terms of your personal involvement and in terms of those individuals who did not get a questionnaire because of their limited involvement.

PLEASE COLLECT THOSE QUESTIONNAIRES AND RETURN THEM WITH THIS ONE.

2. The table on the following page should be filled out as follows (be sure you have read the note at the bottom of the preceding page):

   Column I: Name the piece of equipment or hardware. BE SPECIFIC, provide information that will allow investigators to estimate value.

   Column II: Identify source (examples: "dept.," "media center," "my own").

   Column III & IV: Enter the number of hours the equipment was used according to the nature of the task (Des.= design, and Inst. = instruction).
   Provide estimates by individual "courses," using the number system 1 through 5.

   Column V: Check if you used this equipment or hardware outside of the competency-based program.

EXAMPLE:

(I) NAME/I.D.	(II) Source	(III) Hrs. used this cycle	(IV)	(V) Non-CBE
		Des.	Inst.	
Cassette (SONY-C120)	own	② = 5	—	
16 mm Projector	media center	-	① = 1 ③ = 2	✓
Xerox "4000"	Dept.	① = ½	① = ½ ② = ½ ③ = ½	✓

Notes concerning Xerox Example: Design time = Rough drafts; Inst. time = Class handouts

(I) NAME/I.D.	(II) Source	(III) Hrs. used this cycle	(IV)	(V) Non-CBE
		Des.	Inst.	

If more space is needed, use the first page of the separate four-page enclosure.

APPENDIX B

Selected Pages from a Cost Analysis Report

Administrative Costs vs. Instructional Costs

administrative costs comprised slightly more than one-tenth of total program costs (Table I). Most administrative efforts were exerted in Design (55%) and Operation activities (43%). Closer inspection of those two activity areas revealed that the administrators themselves spent between 50% and 60% of their time on Design matters.

Non-Personnel Costs

Administration

Administrative personnel could not estimate consumption of materials or supplies for the Pilot Program. Previous studies suggest that this component would likely be between 4% and 10% of administrative costs or approximately 1% of overall program costs. Equipment use accounted for 1% of administrative costs.

Instruction

Of the ten faculty in the Pilot Program three stated they used no software in their courses, four provided estimates of software consumption, and three stated they could not estimate their use of software. Relative to hardware use, only one faculty member refused to provide an estimate of use although two other faculty stated they used no hardware in their instruction. Most faculty indicated that they used some college provided service in conjunction with their instruction. Most frequently the services were identified as the Library and the Learning Resources Center. However, unless production of software was involved there was no cost to the program from those services.

Previous studies suggest that instructional use of materials, services and equipment could amount to as little as 2% or as much as 10% of instructional costs. Data collected from the Pilot Program indicate that the cost at Cortland is very close to the 2% figure.

Instructional Costs

Instructional costs amounted to approximately 87% of total program costs (see Table I). This amount was distributed as follows:

Design	44%
Invest./Prod.	5%
Operation	51%

Approximately 12% of all instructional costs were spent on program activities which were not directly related to courses. Such activities included program planning, research, and advising Pilot Program students about non-course related matters. The remaining instructional costs were distributed as follows (See Table II):

Ed 471 - Foundations of Education	3%
Ed 446 - Independent Study	4%
Ed 291 - Introduction to Teaching	4%
Ed 464 - Methods & Materials II	8%
Ed 463 - Methods & Materials I	11%
Ed 390 - Student Teaching	49%

The relatively high cost of student teaching is readily apparent. The fact that it is more expensive is not surprising. Tuition waivers given to supervising teachers are a factor influencing the cost. Waivers amounted to 18% of the cost of student teaching and are equal to or greater than the direct costs of most of the courses identified above. Even when waivers are not considered in the cost of student teaching, the relative cost remains high. The primary factor is that six faculty are involved in student teaching, whereas only one or two are involved in most of the other courses.

Cost by Activity Type

The proportion of course related instructional costs attributed to Design, Investment/Production and Operation Activities were as follows:

Course	Des.	I/P	Oper.
Ed 446 - Independent Study	49%	11%	40%
Ed 463 - Methods & Materials I	48%	11%	41%
Ed 291 - Introduction to Teaching	43%	4%	53%
Ed 471 - Foundations of Education	41%	0	59%
Ed 390 - Student Teaching	32%	3%	65%
- with tuition waiver removed	39%	4%	57%
Ed 464 - Methods & Materials II	23%	14%	63%

This information was taken from Tables III through VIII.

Per Pupil Costs

In the table below, per pupil costs have been computed four ways. The first column of costs was computed on the basis of total raw data adjusted to allocate adminstration costs across the program (Table II). The second cost column was computed on the basis of raw data adjusted to allocate administration and design costs (Table II). The third cost column represents only instructional costs, which have been adjusted to allocate design costs (Tables III - VIII). The last column was computed on the basis of the operational costs only (derived from Tables III - VIII).

Course	Enrollment	Total Raw data	Adj. for Design	Total Inst. Only	Operation (Instruc.)
Ed 471	17 students	$ 123	$ 107	$ 62	$ 37
Ed 291	17 students	$ 157	$ 136	$ 91	$ 49
Ed 446	17 students	$ 161	$ 136	$ 93	$ 37
Ed 464	17 students	$ 243	$ 223	$ 178	$ 113
Ed 463	17 students	$ 376	$ 321	$ 276	$ 112
Ed 390	17 students	$1203	$1077	$1032	$ 669
Total Program (Table I)		$2808	$2435	$2123	$1090

Additional perspectives about program and per pupil cost can be derived from Figure 1 and Figure 2 which follow Table VIII. Figure 1 is a visual representation of Tables III through VIII and illustrates how course costs are apportioned according to function.

Figure 2 contains three graphs which portray how per pupil costs would vary with enrollment if resources were fixed. This assumes that added students would require no additional resources including materials. Violation of this assumption with respect to class materials would have little impact on the graphs since material cost per pupil is negligible. Possible changes in learner outcomes as a result of these enrollment variations is worth considering.

The graphs in Figure 2 may be used as a planning device to identify what may be the most economical enrollment figure. The more gentle the slope of the curve, the more economical and efficient the operation. For example, if the enrollment of Ed 464 was increased from 17 to 30 students, the per pupil cost would be reduced from $113 to $64. Logistical problems may interfere with the approach of simply increasing enrollments. In such cases, one might investigate the alternative of cost reduction or the alternative of constructing a rationale which suggests that certain costs (student teaching for example) should be absorbed by the program or institution. The latter approach may be the least desirable but only feasible approach.

TABLE I

AGGREGATE COMPETENCY-BASED PROGRAM COSTS

Institution: _____

Program: Pilot Program

Cycle: Fall 1974

COST CENTER / INSTRUCTIONAL ACTIVITY	TOTAL CYCLE		DESIGN		INVEST./PROD.		OPERATION	
	Raw Data	Adj. for Design	Raw Data	Adj. for Design	Raw Data	Adj. for Design	Raw Data	Adj. for Design
ADMINISTRATION								
Administrators	5782	*(4992)	2954	(2164)	101	101	2727	2727
Support Personnel	285	(253)	122	(90)	29	29	134	134
Materials & Services	xx**	xx	xx	xx	xx	xx	xx	xx
Equipment	57	57	29	29	0	0	28	28
SUB-TOTAL:	6124	(5302)	3105	(2283)	130	130	2889	2889
% of Total:	13%	(13%)	-	-	-	-	-	-
% of Admin:	100%	(100%)	51%	(43%)	2%	(2%)	47%	(55%)
INSTRUCTIONAL STAFF								
Faculty	36,094	(30,575)	20696	(15,177)	1718	1718	13,680	13,680
Support Personnel	1,903	(1,892)	435	(424)	65	65	1,403	1,403
Supervising Teachers	3,120	3,120	0	0	0	0	3,120	3,120
SOFTWARE	322	322	127	127	0	0	195	195
HARDWARE	115	115	47	47	0	0	68	68
FACILITIES	0	0	0	0	0	0	0	0
SERVICES	66	66	0	0	0	0	66	66
SUB-TOTAL:	41620	(36890)	21,305	(15,775)	1783	1783	18,532	18,532
% of Instructional costs:	100%	(100%)	51%	(44%)	4%	(5%)	45%	(51%)
TOTAL:	$ 47,744	($41,392)	$ 24,410	($18,058)	$ 1913	1913	$ 21,421	($21,421)
Cost per Pupil:	$2808	($2435)	-	-	-	-	-	-
% of Total	100%	(100%)	51%	(44%)	4%	(5%)	45%	(51%)

* Parentheses indicate allocation of Design costs.

** Administrative personnel could not estimate their use of materials and services.

Note: Personnel salaries have been adjusted on this and subsequent tables to include fringe benefits (14%).

TABLE II

COSTS PER COMPETENCY CLUSTER

Institution. _____

Program: Pilot Program

Cycle: Fall 1974

Enrollment = 17 pupils per cluster

COST CENTER / COMPETENCY CLUSTER	ED 471 - Fndns. of Ed.		ED 446 - Independent Study		ED 291 - Intro. to Teaching		ED 464 - Methods & Materials II	
	Raw Data	Adj. for Design	Raw Data	Adj. for Design	Raw Data	Adj. for Design	Raw Data	Adj. for Design
ADMINISTRATION*								
Personnel	867	(749)	867	(749)	867	(749)	867	(749)
Other	8	8	8	8	8	8	8	8
SUB-TOTAL:	875	(757)	875	(757)	875	(757)	875	(757)
INSTRUCTIONAL STAFF								
Faculty	1206	(1052)	1789	(1520)	1772	(1554)	2137	(1887)
Support Personnel	0	0	0	0	0	0	1139	1139
SOFTWARE	0	0	56	56	5	5	0	0
HARDWARE	8	8	13	13	15	15	8	8
FACILITIES	0	0	0	0	0	0	0	0
SERVICES	0	0	0	0	0	0	0	0
SUB-TOTAL:	1214	(1060)	1858	(1589)	1792	(1554)	3248	(3034)
% of Total Instruc. Costs (see Table I):	3%	(3%)	4%	(4%)	4%	(4%)	8%	(8%)
TOTAL:	$ 3098	(1817)	$ 2733	(2346)	$ 2667	(2311)	$ 4123	(3791)
Cost per Pupil:	$123	($107)	$161	($138)	$157	($136)	$243	($223)

* Allocated equally (at 14.2%) across program.

Note: Figures in parentheses reflect allocation of design costs.

TABLE III

ACTIVITY COSTS PER COMPETENCY CLUSTER

ED 446 - Independent Study

Institution: _____

Program: Pilot Program

Cycle: Fall Semester

INSTRUCTIONAL ACTIVITY / COST CENTER	TOTAL		DESIGN		INVEST./PROD.		OPERATION	
	Raw Data	Adj.for Design	Raw Data	Adj.for Design		cost		cost
INSTRUCTIONAL STAFF								
Faculty	$1789	(1520)*	$1008	(739)	--	$ 179	--	$ 602
Support Personnel	0	0	0	0	--	0	--	0
SOFTWARE	56	56	36	36	---	0	---	20
HARDWARE	13	13	7	7	---	0	---	6
FACILITIES	0	0	0	0	---	0	---	0
SERVICES	0	0	0	0	---	0	---	0
TOTAL:	$ 1858	(1589)	$1051	(782)		$ 179		$ 628
TOTAL:	$ _____		$ _____		$ _____		$ _____	
Cost per Pupil/ $ of Total	$ 109 ($ 93)		56% (49%)		10% (11%)		34% (40%)	

* Figures in parentheses indicate where adjustment has been made to allocate design costs.

TABLE IV

ACTIVITY COSTS PER COMPETENCY CLUSTER

ED 390 - Student Teaching

Institution: _____

Program: Pilot Program

Cycle: Fall 1974

INSTRUCTIONAL ACTIVITY / COST CENTER	TOTAL		DESIGN		INVEST./PROD.		OPERATION	
	Raw Data	Adj.for Design	Raw Data	Adj.for Design		cost		cost
INSTRUCTIONAL STAFF								
Faculty	$15913	(13921)	$7469	($5477)	--	$525	--	$7919
Support Personnel	296	(275)	59	(38)	--	75	--	112
Supervising teachers*	3120	3120	0	0	--	0	--	3120
SOFTWARE	120	120	47	47	---	0	---	73
HARDWARE	53	53	16	16	---	0	---	0
FACILITIES	0	0	0	0	---	0	---	0
SERVICES**	66	66	0	0	---	0	---	66
TOTAL:	$19568	(17555)	$ 7591	($5578)	$ 600		$ 11377	
Cost per pupil/ $ of Total	$1151 ($1032)		39% (32%)		3% (3%)		58% (65%)	

* Figures indicate tuition waivers.
** Automotive pool.

Note: Figures in parentheses indicate that adjustment has been made to allocate Design costs.

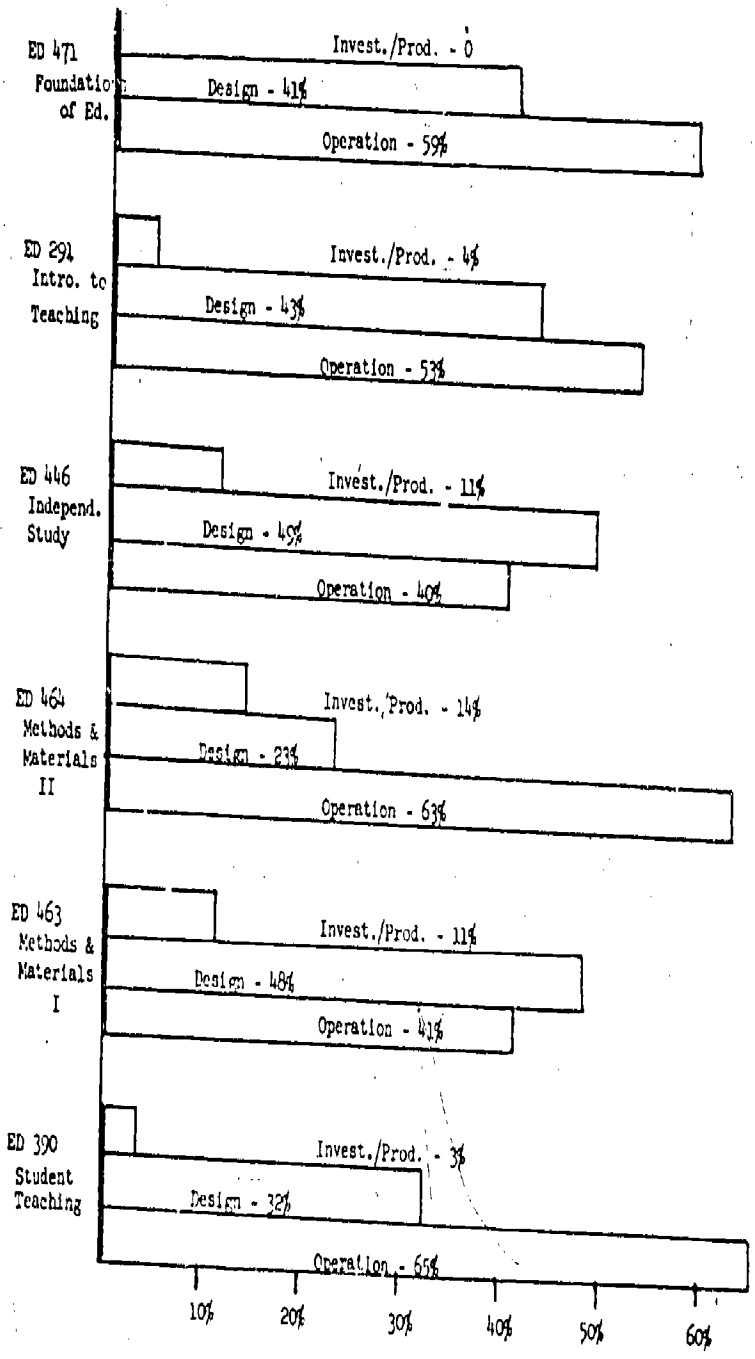
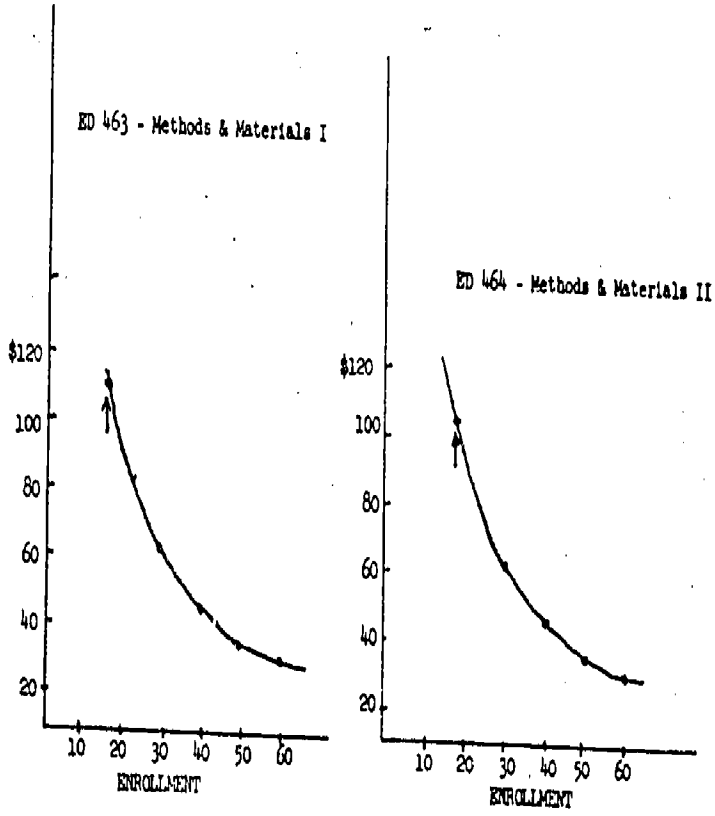


FIG. 1 - Breakdown of total instructional cost of competency clusters by percent. Figures taken from Tables III through VIII and incorporate adjustment for allocation of Design costs.



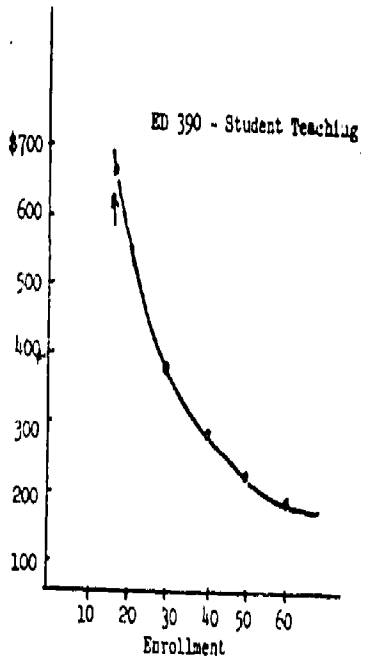


FIG. 2 - Operation costs per Competency cluster (arrow indicates current enrollment).

APPENDIX

Hardware and Equipment Costs

Hardware and equipment costs used in this report are based on standardized costs. These standard costs may be converted to personalized program costs by use of the worksheet contained in this appendix (pages 30 and 31).

The worksheet consists of three main sections. The first section lists the type of device being used in the program and contains space for particular features of the equipment to be listed. Such features include purchase price and expected life. The yearly depreciation rate established from such information is prorated for the particular period or semester being evaluated. In the example this is considered to be 37.5% because the period in question is the fall semester which comprises slightly more than one-third of a year. This rate ($23.6 in the example) is then multiplied by a "CBTE use rate" which is provided for all items and which was established from the questionnaires. In the example a "CBTE use rate" of 80% is given because this is the portion of time a secretary claimed she used the typewriter to produce CBTE materials. The multiplication yields a dollar "CBTE use rate."

The second section of the worksheet consists of various "use factors" which were established from data elicited by the questionnaires. These "use factors" are multiplied by the "CBTE use rate" (the dollar figure) to provide cost information in section three.

In the example a use factor of 29% is given for producing materials assumed to be used in administrative design activities. This use factor was established by clustering time a secretary reportedly spent typing specific kinds of materials for administrators and determining what fraction this represented of her total typing time. The secretary reported that she

spent her typing time equally for adminstrative and instructional purposes. Of her administrative typing, 58% was for materials assumed to be used in design activities. The product of the multiplication is entered in the eppropriate matching column in the third section, e.g., $18.9 times .29 equals $5.48.

Pages 28 and 29 contain data used for determining hardware and equipment costs. These costs are reported in the body of this report. The basis of the standard costs (column 3 of pages 28 & 29) is detailed on page 27. Pages 30 and 31 are provided in order that hardware and equipment costs may be "personalized," i.e., data that are program specific may be added to the forms in order to establish program specific costs. The blank spaces which occur in columns 13 through 18 indicate the cost data which must be calculated if personalized data are desired.

On pages 28 and 29, the investigators assumed a use rate of 10% because the enrollment of the CBTE program constituted about 10% of the total enrollment. More specific data were not available. A different use rate may be assumed for pages 30 and 31.

"STANDARD EQUIPMENT" FOR COST ANALYSES

ITEM	BRAND & MODEL DETAILS	PRICE	SOURCE
EQUIPMENT			
TYPEWRITER	IBM Selectric II, dual pitch, 15" carraige	$560	Purchasing office of large Eastern university
DITTO	AB Dick, model 5530	$897	"
MIMEOGRAPH	A. B. Dick, model 217	$490	"
STENCIL CUTTER (& transparencies)	A. B. Dick, model 588	$971	"
XEROX	Xerox 4000	$240/mo.	Xerox Corp.
HARDWARE			
VIDEO TAPE PLAYER	SONY, AV-3650 (1/2 inch)	$1245	NAVA*
VIDEO CAMERA	SONY, AVC-3210	$530	"
VIDEO MONITOR	SONY, CVM-112	$275	"
OVERHEAD PROJECTOR	BUHL Projector Co., 80/14	$160 + $12 for roll	"
SLIDE PROJECTOR	Eastman Kodak, model B-2 (with case)	$175	"
FILMSTRIP PROJECTOR	Educational Projections, 300-HS (w. case)	$80	"
16 mm FILM PROJECTOR	Singer, model 1015 (optical sound)	$755	"
Super 8/8mm Projector	Eastman Kodak, MFS-8 (silent)	$350	"
VIEWER	Viewlex, Superviewer V-700	$175	"
TAPE RECORDER	Wollensak/3M Co., model 1520AV	$200	"
CASSETTE RECORDER	Audiotronics Corp., 145	$50	"
RECORD PLAYER	V-M Corp., model 216P-4AV	$85	"
HEADSETS		$36	composite est.

* NAVA = National Audio-Visual Association, The Audio-Visual Equipment Directory, 20th Edition, 1974-75.

PILOT PROGRAM

ESTIMATED EQUIPMENT COSTS

1 ITEM/NAME AND MODEL	2 DATE PURCH.	3 PRICE NEW	4 YEARLY RATE @ 5 Yrs.	5 ADJ. RATE (37.5)	6 CBTE USE (%) RATE	7 "USF FACTORS" ADMINISTRATION D	8 I/P	9 O	10 INSTRUCTION D	11 I/P	12 O	CRSE*	13 PERSONALIZED COSTS ADMINISTRATION D	14 I/P	15 O	16 INSTRUCTION D	17 I/P	18 O
EXAMPLE - TYPEWRITER	1973	$500	$63	$ 23.6	(80) $18.9	.29	.105	.105	.217	.086	.197		5.50	2.00	2.00	4.10	1.60	3.70
Typewriter #1 (adminis. Inventasch) Dept. of Ed	-	$ 560	$ 112	$ 42	(10) $ 4.2	.50	xx	.50	xx	xx	xx		$ 2.	xx	2	xx	xx	xx
Typewriter #2 - Dept. of Ed (Ware)	-	$ 560	$ 112	$ 42	(10) $ 4.2				.28	for	Ed.	291	xx	xx	xx	1	xx	xx
Typewriter #3 - Campus School (Mengel)	-	$ 560	$ 112	$ 42	(10) $ 4.2	xx	xx	xx	.72	for	Ed.	446	xx	xx	xx	3	xx	xx
Typewriter #4 - Campus School (North)	-	$ 560	$ 112	$ 42	(10) $ 4.2	xx	xx	xx	1.00	xx	xx	390	xx	xx	xx	4	xx	xx
Xerox (Proj. Change)	@ $240/mo.	X 4 mos.		$ 960	(10) $ 96	xx	xx	xx	1.00	xx	xx	390	xx	xx	xx	4	xx	xx
Ditto (Dept. of Ed)	-	$ 897	$ 179.4	$ 67	(10) $ 6.7	.25	xx	.25	.25	xx	.25	all	24	xx	24	24	xx	24
Ditto (Campus School)	-	$ 897	$ 179.4	$ 67	(10) $ 6.7	.50	xx	xx	xx	xx	.50	390& 463	3	xx	xx	xx	xx	4
Thermofax (LRC)	-	$ 971	$ 194	$ 73	(10) $ 7.3	xx	xx	xx	.25	xx	.75	390	xx	xx	xx	2	xx	5
Mimeograph (Dept. of Ed.)	-	$ 490	$ 98	$ 37	(10) $ 3.7	xx	xx	xx	1.00	xx	xx	463& 291	xx	xx	xx	7	xx	xx
Language Master	-	$ 200	$ 40	$ 15	(10) $ 1.5	xx	xx	.50	xx	xx	.50	all	xx	xx	2	xx	xx	2
						xx	xx	xx	xx	xx	1.00	390	xx	xx	xx	xx	xx	2
											TOTAL: CARRY FORWARD:		$29	0	$28	$45	0	$37

DIRECTIONS:

Columns 1,2,3 = enter data from records
Column 4 = estimate depreciation rate or assume a value (in example = 8 yrs.; 500 ÷ 8 = $63)
Column 5 = adjust rate in column 4 to reflect use during the period of cost study (example assumes 37.5% of use occurs during fall semester. $63 X .375 = 23.625)

Column 6 = Col. 5 times rate (%) in 6
Rate determined from questionnaires.
Columns 7 through 12 = factors determined from questionnaires.

*CRSE=Course to which cost is charged

Column 13 = 6 X 7 Column 16 = 6 X 10
Column 14 = 6 X 8 Column 17 = 6 X 11
Column 15 = 6 X 9 Column 18 = 6 X 12
(example rounded to nearest $1.00)